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ABSTRACT

The purpose of this study was to determine whether field-independent learners are better suited to agricultural distance education programs than their field-dependent counterparts. The sample population for this descriptive correlational study consisted of all students seeking a degree and/or advanced formal training in agriculture through an off-campus professional agriculture degree program at a midwestern land-grant university. The Group Embedded Figures Test (GEFT) was used to determine the preferred cognitive style of the distance learners. To compare attitudes of field-independent and field-dependent learners toward videotape and ICN (Interactive Communications Network) instruction, a media split was used. Attitudinal and demographic data were collected by mailed questionnaire. As a group, the agricultural distant learners were relatively more field-independent than the norm groups. Additionally, field-independent learners were more positive about the likelihood of enrolling in additional courses delivered by either videotape or ICN. Although the orientation of this group, particularly the female students, to a more field- independent cognitive style was noted, field-dependent learners were equally satisfied with videotape delivery of instruction when compared with their counterparts. Field-dependent learners were slightly more satisfied with ICN overall, but the difference between attitude scores was less than expected. Besides issues of diversity, knowledge of cognitive styles of agricultural distant learners may have implications for selecting instructional strategies. This study suggests that distance learning programs can be developed to meet the needs of both field-independent and field-dependent learners. (Contains 17 references.) (AEF)

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ED 409 854

Are Distance Education Programs More Acceptable to Field-Independent Learners?

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Abstract

Students enrolled in courses offered through an off-campus professional agriculture degree program were more likely to possess a field-independent cognitive style. Furthermore, the agricultural distant learners were relatively more field-independent than the original GEFT norm group (Witkin et al., 1971) and a college of agriculture norm group (Torres, 1993). Both field-independent and field-dependent learners were satisfied with the distance delivery options provided through the off-campus professional agriculture degree program. Perhaps, the most notable difference between the field-independent and field-dependent learners was the more positive response of field-independent learners regarding the likelihood of enrolling in additional agriculture courses delivered through distance education technologies. Besides issues of diversity, knowledge of cognitive styles of agricultural distant learners may have implications for selecting instructional strategies. Theoretically, instruction that is in harmony with an individual's learning style will improve the student's performance, shorten study time, and improve the student's attitude toward learning (Chinien & Boutin, 1993). Further research is recommended to test the effect of style specific instruction in agricultural distance learning programs. In the interim, a variety of delivery tools, methods, and social support structures should be used.

Introduction

Cognitive theory concentrates on the conceptualization of students' learning processes. It focuses on the way information is received, organized, and retained by the brain (Thompson, Simonson, & Hargrave, 1991). Knowledge of students' learning styles can aid educators in understanding these mental processes. DeBello (1990) defined learning style as "the characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (p. 203). Much of the learning style research (Cano, Garton, & Raven, 1992a, 1992b; Cano & Metzger, 1995; Garton, 1993; Torres, 1993) done by agricultural educators involved assessment of the field-dependence/ independence psychological dimension. This dimension relates to global vs. analytical perceiving and the ability to perceive items without being influenced by the surrounding field (Chinien & Boutin, 1993).

Although a plethora of research exists on learning styles, with several published works related to agriculture, no published research was found that investigated the learning styles of agricultural distant learners. Distance education programs in agriculture are becoming more common, yet little is known about the characteristics of students who enroll in these programs. Research (Miller, 1995a; Miller & Honeyman, 1993) involving students enrolled in one agricultural distance learning program suggests that distant learners prefer being able to control the pace of their learning, prefer independent study, have less need for structured learning experiences, and have less need for interaction with the instructor and with other students. Garton (1993) provided a thorough review of the literature on field-dependent and field-independent learner preferences. This review emphasized the extremes of the continuum of learning styles, and not all learners of either learning style preference will necessarily exhibit all characteristics and behaviors associated with their style. Selected learner characteristics and behaviors from Garton's review are summarized in Table 1. When what is known about agricultural distant learners and distance learning programs is related to the learning style preferences identified by Garton, one might reasonably conclude that field-independent learners are better suited to distance learning programs than their field-dependent counterparts. Can such a conclusion be substantiated through research? Learning styles research in agricultural distance education is needed to promote our understanding of distance teaching and learning.

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Table 1. Selected Characteristics and Behaviors Associated with the Field-Dependent and Field-Independent Learning Styles

Learning Style	Field-Dependent	Field-Independent
	Prefer externally defined goals and organization.	Can provide their own structure for learning activities.
	Value positive reinforcement from the teacher.	Do not typically respond to positive reinforcement offered by teachers.
	Have well-developed social skills and are more attuned to social cues.	Have poorly developed social skills and are more socially independent.
	Favor extrinsic motivation.	Are intrinsically motivated.
	Prefer collaboration.	Prefer competition.

Purpose and Objectives

The purpose of this descriptive study was to determine whether field-independent learners are better suited to agricultural distance education programs than are their field-dependent counterparts. The research objectives were as follows:

1. Determine if students enrolled in agricultural courses delivered through distance education technologies were characterized more by the cognitive style of field-independence than normative groups.
2. Compare attitudes of field-dependent and field-independent learners toward distance education delivery tools (i.e., videotape, interactive communications network [ICN]).
3. Describe relationships between cognitive style and selected student characteristics.

Methods

The population for this descriptive correlational study consisted of all students seeking a degree and/or advanced formal training in agriculture through an off-campus professional agriculture degree program at a Midwestern land-grant university. The sample (n=191) included all students who enrolled in one or more of the eight agricultural courses delivered through distance education technologies during Spring and Fall Semesters of 1995. Courses were offered in agronomy (three courses), agricultural systems technology, animal science, animal ecology, sociology, and biochemistry.

The Group Embedded Figures Test (GEFT) (Witkin, Oltman, Raskin, & Karp, 1971) was used to determine the preferred cognitive style of the distant learners. The GEFT is a standardized instrument with a reliability estimate of .82. Also, concurrent validity with the Embedded Figures test was .82 for males and .63 for females.

To compare attitudes of field-dependent and field-independent learners toward videotape and ICN-delivered instruction, a median split was used (Spanier & Tate, 1988; Thompson & Knox, 1987). There is no widely agreed upon score that precisely separates field-dependent and field-independent learners. It is correct, however, to conclude that within a group of students those who score above the group median on the GEFT are relatively more field-independent than those who score below the group median. In this study students who scored below the group median of 14 on the GEFT were labeled field-dependent, and those with scores equal to or greater than the median were labeled field-independent.

The scale for assessing attitudes toward distance delivery media consisted of 11 Likert-type items with response categories ranging from strongly disagree (1) to strongly agree (5). The instrument was previously developed and validated by Miller and Honeyman (1993). The Cronbach's alpha reliability coefficient for the attitudinal instrument was .86.

Identical data collection procedures were used for both Spring and Fall Semesters. Attitudinal and demographic data were collected by mailed questionnaire. One complete follow-up of nonrespondents was conducted. One hundred and sixty students (83.8%) completed and returned the questionnaire. The GEFT was administered by

proctors during a regularly scheduled examination. A letter was sent to all students included in the sample (n=191) approximately one week before the GEFT administration to explain the purpose of the study and to encourage their participation. One hundred (52.4%) students completed the GEFT and 89 (46.6%) students completed the GEFT and the questionnaire.

All data were analyzed with the SPSS personal computer program. Appropriate statistics for description (frequencies, percentages, means, and standard deviations, Pearson correlations, point biserial correlation, and Cramer's V statistic) were used. The magnitude of all relationships was interpreted by using Davis' (1971) descriptors.

Results

The mean score on the GEFT was 12.38 for females and 12.53 for males with a standard deviation of 4.41 and 4.46, respectively. GEFT scores from the present study were compared with normative groups to determine whether agricultural distant learners tended toward a field-independent cognitive style. Both male and female students in the present study obtained scores on the GEFT that were higher than the original normative group reported by Witkin et al. (1971) in the GEFT manual. Higher scores on the GEFT are associated with the field-independent cognitive style. Also, mean scores from the present study were compared with those reported by Torres (1993). Torres studied a representative sample of senior college of agriculture students. Females in the present study obtained higher GEFT scores whereas males attained lower scores than those in the Torres study (Table 2).

Table 2. Comparison of the Mean Scores on the GEFT for Male and Female Subjects in the Present Study with Scores of Normative Groups

	Present Study	Witkin et al, 1971	Torres, 1993
Females			
n	21	242	44
Mean	12.38	10.8	11.1
S.D.	4.41	4.2	4.6
Males			
n	79	155	59
Mean	12.53	12.0	13.4
S.D.	4.46	4.1	3.8
Overall			
n	100	397	103
mean	12.50	11.27	12.40
SD	4.43	4.2	4.27

Torres (1993) classified students who obtained GEFT scores above the national mean (11.3) as field-independent. Using this classification procedure, Torres labeled 61.2% of the college of agriculture seniors as field-independent. The same procedure, when applied to the current study, classified 62% of the students as field-independent.

Attitudes held by field-independent and field-dependent students toward instruction delivered by distance education technologies (i.e., videotape, ICN) were compared. Seventy-nine students provided attitude toward videotaped instruction and cognitive style data. Thirty-seven students were categorized as field-dependent and 42 were labeled field-independent. Overall, both groups held positive attitudes toward videotaped instruction and were particularly positive about the opportunity for learning, the convenience, the ability to control the learning pace, and the prospect of enrolling in additional videotaped courses. Field-independent learners were only slightly more positive about videotaped instruction than field-dependent learners. One notable difference was that field-independent learners were more positive about the likelihood of enrolling in another videotaped course (Table 3).

Twenty-three students provided attitude toward ICN and cognitive style data. Thirteen students were categorized as field-dependent and 10 were labeled field-independent. ICN-delivered instruction provides a television-

based delivery medium via fiber optic cable with live two-way interactive audio and video. Field-dependent and field-independent students held positive attitudes toward ICN-delivered instruction. Field-dependent learners were only slightly more positive than their field-independent counterparts. Field-dependent students provided greater mean scores on attitude items related to the ability to control the pace of learning and their preference for ICN over traditional classroom instruction. On the other hand, field-independent learners were less likely to feel isolated, more positive about the learning opportunity provided by ICN, and more positive about the idea of enrolling in another ICN course (Table 3).

Table 3. Analysis of Mean Attitude Scores by Cognitive Style

Item		Videotape (n=79)		ICN (n=23)	
		$\bar{X}$*fd (n=37)*	$\bar{X}$*fi (n=42)*	$\bar{X}$*fd* (n=13)	$\bar{X}$fi (n=10)
1.	I enjoyed learning from the videotaped/ ICN lessons.	4.21	4.40	4.23	4.20
2.	Videotape/ICN should be utilized more often to deliver agriculture-related instruction.	4.22	4.24	4.31	4.50
3.	I feel more isolated as a student when I take courses by videotape/ICN.	2.89*	2.90*	3.31*	3.60*
4.	I would recommend videotape/ICN courses to my friends.	4.16	4.35	4.46	4.20
5.	Learning through videotape/ICN instruction is convenient.	4.55	4.64	4.38	4.20
6.	Videotape/ICN allows me to control the pace of my learning.	4.34	4.38	3.92	3.40
7.	I prefer videotape/ICN to traditional classroom instruction.	3.32	3.38	3.53	2.70
8.	Learning through videotape/ICN is boring.	3.79*	3.71*	4.15*	4.00*
9.	I would enroll in another videotape/ ICN course.	4.37	4.62	4.46	4.80
10.	Videotape/ICN provides me with learning opportunities that I otherwise would not have.	4.61	4.64	4.39	4.60
11.	I would not take videotape/ ICN courses if I had some other means of acquiring course credit.	3.37*	3.48*	3.69*	3.90*
	Videotape total	3.99	4.07		
	ICN total			4.08	4.01

* Indicates negatively worded items that were reverse coded. Note:*fd*=field-dependent; *fi*=field-independent
Note: Based on Scale: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree.

Negligible associations were found between cognitive style and gender, and attitude toward videotape delivery. Low positive associations existed between cognitive style and occupation and motivation to enroll. Low negative associations existed between cognitive style and age and attitude toward ICN delivery. Field-independent learners were somewhat more likely to have occupations related to farming and agribusiness, whereas field-dependent learners were more apt to have occupations outside agriculture. Field-dependent learners were more likely to be motivated to

enroll in a distance course to pursue a degree, whereas field-independent learners were more likely to cite personal or career development as motivating factors (Table 4).

Table 4. Relationships Between Cognitive Style and Selected Student Variables

Variable	n	Association
Age	100	-.11[a]
Gender	100	-.01[b]
Occupation	97	.15[c]
Motivation to enroll	96	.13[c]
Attitude toward videotape delivery	79	.09[a]
Attitude toward ICN delivery	23	-.14[a]

Note: [a]=Pearson; [b]=point biserial; [c]=Cramer's V

Conclusions and Recommendations

As a group, the agricultural distant learners studied were relatively more field-independent than the original GEFT norm group (Witkin et al., 1971) and a College of Agriculture norm group (Torres, 1993). Additionally, field-independent learners were more positive about the likelihood of enrolling in additional courses delivered by either videotape or ICN. Perhaps field-independent learners are somewhat better suited to this agricultural distance learning program. The proportion of field-dependent learners enrolled in agricultural distance education programs should be routinely monitored. These data should be shared with faculty and administrators to promote awareness of the characteristics of learners enrolled in their programs. Although the distribution of cognitive styles was not drastically skewed in the current study, efforts to encourage diversity of cognitive style in agricultural distance learning programs may be warranted.

Although the orientation of this group, particularly the female students, to a more field-independent cognitive style was noted, field-dependent learners were equally satisfied with videotape delivery of instruction when compared with their field-independent counterparts. Perhaps the range of student services and support mechanisms provided through the off-campus agriculture degree program has helped to create a climate that satisfies many preferences attributed to the field-dependent learner. The off-campus program provides an academic advisor to assist students in planning their programs of study. The advisor also assists students with registration and acquisition of course materials and often serves as a liaison between the student and the instructor. Besides advising support, students are provided access to their instructor(s) through a toll-free phone number. Also, Instructors with off-campus teaching experience are becoming more adept at identifying and meeting needs of distant learners through a variety of mechanisms including the Internet.

Field-dependent learners were slightly more satisfied with ICN overall, but the difference between their attitude score and the one provided by field-independent learners was less than was expected. A much larger difference was found by Miller (1995b), but Miller's study involved a sample only one-third as large as this study. ICN provides more opportunities for interaction with the instructor and other students than does videotape, yet requires that students sacrifice some of their control over the learning environment. This environment, it seems, would be relatively more appealing to field-dependent learners. Learners from both cognitive style groups are satisfied with the distance learning options provided through this program, but for different reasons. When the item means for the attitude scale are considered, the scores are reasonably compatible with what we know about field-dependent and field-independent learners.

Besides issues of diversity, knowledge of cognitive styles of agricultural distant learners may have implications for selecting instructional strategies. Theoretically, instruction that is in harmony with an individual's learning style will improve the student's performance, shorten study time, and improve the student's attitude toward learning (Chinien & Boutin, 1993). Van Vuren (1994) concluded that more positive attitudes and improved academic achievement are promoted when instructional methods account for learning style preferences. Van Vuren, however, did not focus on the field-dependence/ independence psychological dimension commonly studied in agriculture. Furthermore, Claxton and Murrell (1987) report that the small amount of research involving this dimension is contradictory. Further research in agricultural distance learning should seek to isolate cognitive styles, design style

specific instruction, and test the effect on achievement and satisfaction. Meanwhile, students should be given distance learning options various degrees of structure, interaction, and control of the learning environment. No one delivery tool or method will satisfy all learners. Instead, one tool or method used exclusively will discriminate against groups of learners.

Summary

Logic might suggest that distance education by its very nature is best suited to learners with a field-independent cognitive style. This study, however, suggests that distance learning programs can be developed to meet the needs of both field-independent and field-dependent learners. The key to success for field-dependent learners is likely related to the support provided by the off-campus programs office and the innovative methods used by instructors to enhance student-content interaction, student-student interaction, and student-teacher interaction.

Is an understanding of cognitive style important for enhancing teaching and learning? Many would answer this question yes. In fact, Torres and Cano (1995) recommended that workshops be conducted to help instructors, students, academic advisors, and counselors become knowledgeable about learning styles. Such workshops may be helpful in that an elevated awareness of learner diversity and a renewed focus on learning might be achieved. A key question remains, however. What specific instructional interventions can be made to help learners with different cognitive styles experience success in their courses? College teachers of agriculture should engage in action research to find practical ways of using learning styles data to improve instruction.

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